

ENGINEERING REPORT
RED LIGHT RUNNING TRAFFIC MONITORING
SYSTEM

Intersection of:

State Route 99/ Pacific Highway at SR 516/S Kent-Des Moines Rd
Des Moines, WA

Prepared by:

Khai Le, E.I.T.

Reviewed by:

R. Brandon Carver, P.E, P.T.O.E.

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I. INTRODUCTION

this engineering report is intended to provide justification for the installation of intersection safety cameras on State Route 99 (Pacific Highway) at the intersection of S Kent-Des Moines Rd, in Des Moines, Washington.

The intersection of SR 99/Pacific Highway and SR 516/ S Kent-Des Moines Rd is located approximately 0.2 miles west of the Interstate-5. SR 99 & S Kent-Des Moines Rd are both classified as Principal arterials. SR 99 is a 7-lane highway (include transit lanes) divided by a raised median. The posted speed limit on SR 99 is 45mph. Kent-Des Moines Rd is a 6-lane roadway with a 35mph posted speed limit. The 2015 annual traffic report from Washington State Department of Transportation reported an average weekday traffic of 15,000 vehicles per day on the westbound and 34,000 vehicles per day south of the intersection of SR 99 & S Kent-Des Moines Rd.

The area is generally urban with different government services, recreational facilities, employment centers and transit facilities. There is a traffic signal at 24th Ave S, approximately 0.3 miles to the west; and a traffic signal at the ramp entrance to I-5 freeway approximately 0.2 miles to the east. A Location map indicating the intersection is provided below.



Figure 1: SR 99/ Pacific Highway & Kent-Des Moines Rd Intersection Location

II. ENGINEERING REPORT

Pursuant to the terms of the RED LIGHT TRAFFIC MONITORING SYSTEM Agreement GCA-6386, Section 3.2, the following information is provided in support of the installation of Intersection Safety Cameras.

A. Intersection Crash History

The intersection crash history for the past 5 years is summarized in the table below. This information was provided by the City of Des Moines Police Department.

Table 1: City of Des Moines crash history at the intersection of SR 99 & Kent- Des Moines Rd categorized in crash types and crash severity types from 2011 to 2015

Year	Crash Totals	Crash Types					Crash Severity Types		
		Angle	Rear-End	Approach Turning	Side-Swipe	Other	Fatal	Injury	Property Damage
2015	9	0	5	1	3	0	0	5	0
2014	12	1	6	1	2	2	0	3	0
2013	14	1	9	1	3	0	0	2	0
2012	16	2	7	0	5	2	0	4	0
2011	8	1	4	0	2	1	0	3	1
Total	59	5	31	3	15	5	0	17	1

There are a total of 59 crashes at the intersection as indicated on the summary table. This equals to an average of 11.8 crashes per year. 17 crashed related injuries occurred in the 5 year time period.

B. Evaluation of Existing Signal Timings

Table 2: Existing programmed change intervals vs. Calculated change intervals for the intersection of SR 99 & S Kent-Des Moines Rd

	Phase 8 (WB)	Phase 4 (EB)	Phase 2 (NB)	Phase 6 (SB)
Proposed Monitored Approach?	Yes	No	No	Yes
Existing Programmed Yellow Interval, Sec.	4.0	4.0	4.5	4.5
Calculated Yellow Interval, Sec	3.9			3.1

The existing programmed intersection timings from Table 2 were obtained from the Washington State Department of Transportation. A copy of the timing chart is included in the Appendix. In general, the existing Yellow programmed change interval and the calculated Yellow change intervals are summarized in Table 2. The change intervals at this intersection were calculated based on the formula 1 from *ITE's Determining Vehicle Signal Change and Clearance Intervals*.

$$\text{Change Interval} = Y+R = t + \left[\frac{v}{2(a + 32.2g)} \right]$$

Where:

t= reaction time, seconds

v= approach speed, feet/second

a= deceleration rate, feet/second²

g= approach grade, percent/100

For southbound approach:

The approach grade is measured to be a decreasing slope of 1.0%, reaction time of 1.0 second, deceleration rate of 10ft/s², vehicle approaching speeds is 50mph (5 mph over the speed limit). The calculated Yellow change interval equals 3.1s

For westbound approach:

The approach grade is measured to be a decreasing slope of 4.0%, reaction time of 1.0 second, deceleration rate of 10ft/s², vehicle approaching speeds is 40 mph (5 mph over the speed limit). The calculated Yellow change interval equals 3.9s.

D. Evaluation of Traffic Signal Visibility

There are no visual obstructions to the signal heads on the southbound direction of SR 99 and the signal heads on the westbound direction of S Kent-Des Moines Rd. The Longitudinal grades are relatively flat on both approaches. The visibility to the signal meets the required MUTCD standards (Table 4D.12/ Section 4D.12)



Figure 2: Southbound approach, looking south



Figure 3: Westbound approach, looking west

E. Review of Intersection Signs

The signs and markings at the intersection are in good condition and meet the required standards. No other conflicts exist.